



IBM Lets You Have It Your Way — Introduces an Enhanced Storwize V3700

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Management Summary

Most of us have increasing aspirations and a limited budget. We want to be better off than our parents and hope to do more for our children than our parents could do for us. We want a roomier house, a nicer car, and a bigger, flat screen TV to hang on the wall of the roomier house. This is true for most families and most businesses, but especially is true for the smaller business.

For small businesses, often your current information technology is inadequate but your IT budget just isn't big enough to do anything other than "hanging on". You need more capacity and more effective solutions, but without the complexity that often comes with expanding requirements. This is especially true for storage.

What you need to store is growing and adding another silo or bolting on another hunk of storage only allows you to keep hanging on. With each new piece bolted on, administration gets more complex, and it already is too complex. You certainly don't have budget for more people, so you ask everyone to tighten their belts and do a little more. Unfortunately, that won't improve the quality of the services that you are delivering and may limit the effectiveness of your investment. If only you could get a storage solution like those used in enterprise data centers. In fact, you probably would be happy to have 75% of what they have (in capabilities), which still would be a big improvement over what you are using today, if this could be done without breaking the budget. *Is this your unsatisfied desire: getting more and better – yet affordable – storage?*

With the announcement of its new *Storwize V3700* capabilities, IBM is delivering scaled-down capacity (from its upper-class *Storwize V7000*), with scaled up functionality from where you are today. Previously, you couldn't "have your cake and eat it too." Now, just maybe you can. To learn more about the enhanced *Storwize V3700*, please read on.

Small-to-Midsized Storage Pains

Today's smarter data center is built with systems that are increasingly instrumented, interconnected, and intelligent; thus meeting challenges to businesses that need to stay responsive to dynamic environments. A growing volume of data is becoming increasingly valuable, but storing it can be expensive and very difficult to manage, due to the complexity of the architecture and the increasingly-rapid growth. Most IT organizations have limited resources and cannot afford to make investment mistakes. They have to manage their investment in storage very carefully in order to maintain budgetary control. For a smaller data center, a mistake can have damaging effects, potentially jeopardizing operational viability and possibly endangering business sustainability.

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There is one more reality of a 2013 data center. Storage is growing with little or no restraint throughout your business and is eating through your limited IT infrastructure budget. If unchecked, storage will consume every dollar it can find. It does not matter if you are an enterprise data center, midsized data center, or smaller, your storage capacity requirements probably are growing at a rate that seems to be without limits, possibly doubling every 12-to-18 months.

Mission-critical applications are always looking for higher performance, Tier-1 storage, while business-critical applications, such as email, backup and archiving, are filling almost every high-capacity, Tier-2 drive that you have and requiring even more capacity for replication and data protection. Over-provisioning these drives for the future, as well as today, results in significant waste due to poor utilization for most if not all of the life of the storage solution.

In the largest data centers, storage area networks (SANs), islands of high-performance Fibre Channel (FC) arrays often are competing for increasingly expensive administrative attention with islands of high-capacity SAS disks, trying to determine which array is the correct resource for storing the application data that they *really* need. Similarly, a variety of archiving solutions are competing with platforms dedicated to the storage of unstructured objects. ***How many storage architectures do you have competing for those same resources throughout your business?***

Today's small and midsized data centers need to provide the same seamless delivery of IT services as the major enterprise data centers, perhaps without the FC, hopefully via a single storage architecture that simplifies the support of all critical applications and data types regardless of their server environment – physical, virtual, or cloud. Today's business is mining its data for more valuable information every day, analyzing data to retrieve information from seemingly huge "Big Data" repositories throughout the business, not just within the walls of the data center. Because this now is critical to the operational success of the business, the CIO of every business, regardless of size, is demanding that the IT staff ensure against the risk of data loss and unavailability, while also preserving the IT budget.

On the server frontlines, application consolidation and server virtualization have enabled the IT staff of small and mid-sized data centers to reduce the TCO attributable to the server

infrastructure, but *what is being done to reduce the TCO for storage in the midsized or smaller data center?* **With multiple applications sharing the same server resources, the smaller data center now must look toward upgrading their storage environment to support multiple tiers of storage, from high-capacity HDDs to high-speed SSDs, to deliver dynamic scalability, and to accommodate a virtualized environment demanding higher I/O throughput. The performance of most applications, for all sizes of data centers, has become critical.**

Small and Midrange Storage Requirements

Improving performance in many enterprise data centers usually means upgrading their SAN to support a high availability, 8Gbps FC connectivity. For the smaller data center, this usually means a requirement to deploy both 6Gb SAS and 1Gb iSCSI connectivity, in order to unify and simplify the network connectivity and to avoid the high acquisition costs and even higher administrative costs associated with FC SANs.

These data centers also want to simplify administration by consolidating all existing drive protocols onto a single array. Thus, if desired, the data center can deploy SAS for their highest performing applications that also require high availability, while using iSCSI for any high-capacity storage required, thus likely lowering the TCO of the IT infrastructure.

Using yesterday's storage solutions and multiple storage architectures to solve today's data center challenges probably is not sufficient, especially for the small-to-midsized data center, which now probably needs to change this storage paradigm. By evolving from decades-old legacy models (with many silos of storage), this unification can prepare the way for the delivery of ITaaS¹ and cloud-based storage.

Larger enterprise data centers, with higher budgets and a broadly-skilled set of storage administrators that often carry a significantly higher salary, have resources available to them that do not exist in the midsized or smaller data center. Even so, there may be less of a difference in the needs of smaller data centers when compared to the larger ones. **Frequently, the smaller data center needs storage solutions that are built into most of the hardware and software functionality found on enterprise-level storage arrays.**

¹ Information Technology as a Service.

In terms of hardware, that data center is looking for a single multi-tiered, storage solution that includes most, if not all, of the following features found in larger enterprise arrays.

- **Solid State Drives (SSDs)** for their highest performing applications requiring very high IOPS. This often is the case for databases.
- **High-performance SAS** drives to satisfy mission-critical Tier-1 application requirements at a lower cost than with FC drives.
- **Data integrity features to ensure the reliability of the data.** To fully utilize your storage capacity, the storage platform needs to be able to create RAID arrays that span multiple chassis.
- **High-capacity** drives to fulfill the rapidly growing needs of Tier-2 business-critical applications, such as email and other web-facing requirements.
- **Internal virtualization** capabilities to improve the utilization rates of the storage device, in much the same way that the data center has consolidated and virtualized their server infrastructure to improve the TCO of the IT environment.

The technology roadmap for primary storage software for the smaller-to-midsized data center includes the same functionality provided to many of their bigger brothers – in terms of:

- Easy-to use storage management;
- Data retention and protection;
- Thin provisioning; and
- Storage services, including performance monitoring.

Many storage vendors have a very broad range of products that they can try to force-fit into any solution. IBM is no different; it has an extremely broad range of storage solutions for the smaller-to-midsized data center, including the *DS3500*², *N series*, and *Storwize V7000*³. However, rather than try to force-fit one of these into a smaller environment, IBM has chosen to meet the specific needs of the smaller data center by scaling the *Storwize V7000* to the needs of the smaller environment with the announcement, last November, of *Storwize V3700*. The *V3700* has

much the same functionality deployed for the *V7000*, thus minimizing the impact on the IT staff.

This new, innovative, storage platform has changed the storage paradigm. Using an IBM-developed platform with built-in innovations from IBM Labs, the *V3700* was designed specifically to meet the storage requirements of the smaller data center that requires functionality features usually only found in larger enterprises. **IBM's range of storage solutions got better, especially for the smaller data center!**

Before we delve into the new features, functions and configurability of the *V3700*, let's take a look back to 2010 and the announcement of *Storwize V7000*, the *V3700*'s "big brother".

A Family of Solutions

In an attempt to meet both the scalability and functionality requirements of the mid-sized data center, IBM introduced *Storwize V7000* in September 2010 as a multi-tiered, scalable mid-range storage solution with enterprise-class capabilities and outstanding performance. It was specifically designed to meet the growing scalability requirements of the midsized-to-larger data center, incorporating functionality usually only found only in the high-end arrays. *Storwize V7000* changed the paradigm for unified storage in the data center.

IBM delivered a new, innovative, storage architecture and combined it with hardware and software innovations from other IBM platforms, including the integration of RAID code from the *DS8000*⁴, solid state disk drives⁵ (SSDs), a rich software stack from the *SAN Volume Controller*⁶ (SVC), and the graphical user interface (GUI) from the *XIV* product line. It introduced embedded analytics and flash optimization to enable the IT staff to deploy storage faster than before, with the simplicity demanded by an undermanned staff. It allowed the data center to start small and scale up, to a total of 240 drives, more than enough for many larger enterprises (and up to 960 drives – with clustering). In 2012, IBM extended

⁴ See [The Clipper Group Navigator](#) entitled *Maximizing the Business Value of Information and Lowering Energy Consumption with IBM's DS8700* dated April 13, 2010, at <http://www.clipper.com/research/TCG2010018.pdf>.

⁵ See the issue of [Clipper Notes](#) dated January 26, 2009, entitled *A New Tier of Storage Appears – Faster, Solid-State Drives State Their Case*, and available at <http://www.clipper.com/research/TCG2009006.pdf>.

⁶ See [The Clipper Group Navigator](#) entitled *IBM Upgrades SVC with Solid State Drives – Achieves Better Storage Utilization* dated October 14, 2009, and available at <http://www.clipper.com/research/TCG2009046.pdf>.

² See [The Clipper Group Navigator](#) entitled *Delivering Enterprise Features for the Mid-Range – IBM Introduces DS3500 with TPC MRE*, dated June 7, 2010, at <http://www.clipper.com/research/TCG2010027.pdf>.

³ See [The Clipper Group Navigator](#) entitled *IBM Brings Enterprise Functionality to Mid-Range Storage* dated October 7, 2010, and available at <http://www.clipper.com/research/TCG2010047.pdf>.

Exhibit 1 — IBM Storwize V3700 2.5” and 3.5” Enclosures



Source IBM

the functionality and efficiency of the V7000 with *Real-Time Compression*.⁷ All of this was complemented with IBM Smarter Storage software, enabling the data center to use less storage and achieve better results.

The Storwize family consisted of the IBM SAN Volume Controller, *IBM Flex System V7000 Storage Node*, a fully integrated option, *Storwize V7000 Unified*, for files, and *Storwize V7000*. The entire family is configured for five “9”s reliability and ease-of-use simplicity from a management GUI to enable fast deployment and efficiency. IBM has positioned Storwize to compete favorably with EMC VNX, Dell, HP, and NetApp.

IBM Storwize V3700

The IBM Storwize V3700 (See Exhibit 1, above) is the newest addition to the Storwize family of disk systems. Taking advantage of proven IBM Storwize V7000 and IBM SVC functionality and management tools, Storwize V3700 delivers innovation and new levels of storage efficiency with ease of use in an entry disk system, to enable smaller organizations to overcome their storage challenges. It was designed with high-availability to support dual-active, intelligent nodes with mirrored cache, dual port disk drives with automatic drive failure detection and RAID rebuild with global hot spares, redundant power supplies and fans, hot-swappable and customer replaceable units (CRUs), and automated path failover support for the data path between the server and the drives. Data protection features include RAID and *FlashCopy* to create logical or physical copies of data for file restoration and backup. The storage administrator can create a RAID array using one of the automatic wizards, included, or do it manually. RAID arrays configured by a wizard are normally configured with a single enclosure, but they may be configured to span multiple enclosures, manually. This reduces the number of

spares required in larger configurations. From a budgetary standpoint, IBM includes these advanced software functions in the base price of V3700.

The V3700 can be attached to *IBM System x* and *Power Systems*, the *IBM Flex System*, and *BladeCenter*. It can also support other Intel and AMD processor-based servers, HP *Itanium* and *PA-RISC* servers, along with Oracle *SPARC* servers.

While Storwize V7000 did change the storage paradigm, there still was a gap between entry systems and the midrange. Many data centers did not need the scalability to 240 or more drives that V7000 provided, nor could they afford it. Storwize V3700 was announced specifically to address that gap, the needs of the smaller data center that does not have the storage capacity or staffing needs required by others. Storwize V3700 provides an easy to manage, efficient entry-level storage system designed to address the growing data requirements and server consolidation of the smaller data center, but a data center that still has scalability needs of over 100TB in a low-cost envelope. The V3700 dual-controller enclosure comes with LFF⁸ disks or SFF⁹ disks.

With the capability to deploy up to (12) 3.5” disks (LFF), or up to (24) 2.5” devices (SFF), in separate enclosures, the V3700 packs a big punch in a compact chassis, a 2U rack-mountable chassis, as compared to the 3U and 4U form factors offered by some of IBM’s competition. All drives are dual-port, hot-swappable 6Gb SAS drives. The V3700 is designed to support SFF SSDs, either 200GB or 400GB E-MLC SAS drives, SFF SAS disks, from 146GB at 15K RPM to 900GB at 10K RPM. The V3700 also supports up to 3TB LFF drives or up to 1TB with SFF devices, all at 7200 RPM.

The control enclosure for V3700 has dual active-active controllers with up to 8GB of cache.

⁷ See [The Clipper Group Navigator](http://www.clipper.com/research/TCG2012013.pdf) entitled *Significantly Improving Storage Efficiency – IBM Adds Real-Time Compression to Storage* dated June 4, 2012, at <http://www.clipper.com/research/TCG2012013.pdf>.

⁸ Large Form Factor = 3.5” drive.

⁹ Small Form Factor = 2.5” drive.

It also comes with four 1Gb iSCSI host ports standard, and optionally with up to eight additional iSCSI ports, eight 8Gb FC ports, or four 10Gb iSCSI/FCoE ports. The control enclosure is supported by up to four expansion chassis, each 2U in size, making the system capable of holding up to a total of 120 SFF drives or up to 60 LFF devices, for a total system capacity of up to 180TB, using 3TB drives. The IT staff can mix drive types and capacity points within a chassis and they also can mix HDD devices with SSD devices in a single SFF enclosure. The V3700 has RAID levels 0, 1, 5, 6, and 10 for data protection, along with the functionality of the V7000. (See Exhibit 2, to the right.) The V3700 carries a three-year warranty with CRUs and on-site service, along with optional warranty service upgrades.

At the time of the V3700 launch (November 2012), IBM indicated plans to enhance the V3700 with 6Gb SAS host attachment support, along with Easy Tier, remote mirroring and FlashCopy for up to 2,040 targets. And now there is more!

Storwize V3700 Enhancements

IBM has enhanced the V3700 with everything that they had indicated, and more. In the latest V3700 announcement, IBM has extended attachment protocols with SAS host attachment for a total of six 6Gb SAS host ports standard and optionally with up to eight additional 6 Gb SAS ports. In addition, IBM has qualified new 1.2TB SFF drives for the V3700 and has issued a statement of direction (SOD)¹⁰ for 4TB LFF drives. With the 1.2TB SFF drives, the maximum capacity is 144TBs and with the existing 3TB drives, the maximum capacity is 180TBs. IBM also has increased the performance of the V3700 with an optional turbo performance to increase maximum IOPS by 50% and maximum throughput by 100%.

In addition, IBM has provided the following optional licensed functions for the Storwize V3700.

- **IBM System Storage Easy Tier** to optimize costs for mixed workloads;
- **A FlashCopy upgrade** to extend FlashCopy targets from 64 to 2040, enhancing data center ability to take more frequent copies, reducing the risk of data loss; and
- **Remote Mirroring** to enable the IT staff to keep a copy at a remote location for recovery.

¹⁰ IBM's plans are subject to change.

Exhibit 2 — Storwize V3700 Management Components and Capabilities

- IBM System Storage Easy Tier*
- IBM FlashCopy technology*
- IBM FlashCopy Manager
- RAID levels 0, 1, 5, 6, and 10
- Internal virtualization
- Turbo performance*
- Asynchronous remote block mirroring*
- Data migration
- Thin provisioning
- Storage performance monitoring
- Capacity planning and forecasting
- Record/document management
- IBM Systems Director
- Tivoli Storage Productivity Center
- Tivoli Storage Manager

*New enhancements announced in June

Source: IBM

Let's take a closer look at these enhancements and some of the more significant V3700 features. All of the licensed options come with a one-time charge per system, with no extra charge for expanded capacity.

Storwize V3700 GUI

Based upon the heralded V7000 graphical user interface, the V3700 GUI hides complexity while enabling the user to access storage from any platform. It is easy to use, with simple, guided navigation between screens, with variables preset for the inexperienced administrator, but available for the advanced user. A volume can be provisioned in as few as six clicks. IBM has stated that any Storwize system is 47% less time-consuming and 31% less complex than managing a competitive system.

Virtualization

Internal virtualization makes the V3700 more efficient by design. It enables fast, flexible provisioning with regard to data location and easy-to-make configuration changes. It enables non-disruptive movement of data between tiers, with Easy Tier. It optimizes data placement to improve performance with higher-level functions, such as Easy Tier, without being aware of the physical location of the data.

Thin Provisioning

The V3700 features self-optimizing thin

Exhibit 3 — IBM Storwize V3700 Key Differentiators

Customer requirement*	Differentiator	Proof points
Managing Storage complexity	Ease of use	<ul style="list-style-type: none"> • Intuitive user interface based on proven GUI, initial set up in a few minutes and volume provisioning in as few as four clicks
Managing Storage Growth	Internal virtualization and thin provisioning	<ul style="list-style-type: none"> • High performance thin provisioning and internal virtualization • Host attachment and drive type flexibility • Up to 4 expansion enclosures
Managing Cost	Affordable price for an advanced entry disk system	<ul style="list-style-type: none"> • Real-world configurations at less than 11K USD
Dealing with Storage Performance Problems	High performance in an entry disk system	<ul style="list-style-type: none"> • Up to 8GB of cache per controller, SSDs and EasyTier

* Pain points for SMB according to InfoPro (1H2012 Storage Industry Profile)

Source: IBM

provisioning to enable the application to grow dynamically and allow the IT staff to make better utilization of the available storage. It works across all supported host platforms by enabling the application to consume only the space it is using.

Easy Tier

The V3700 version of Easy Tier supports two tiers, one of which must be SSD. It enables the V3700 with the ability to identify and isolate the most active data and automatically relocates it to high-performance SSDs with the highest IOPS available, virtually eliminating hot spots due to poor data layout. This allows the remaining, rarely used data to consume the high-capacity, lower-cost disks. In addition, Easy Tier enables much better performance with only a modest investment in SSDs, helping smaller enterprises with limited budgets.

Remote Mirror

Remote Mirror enables the data center to use off-site facilities to ensure data availability. It works synchronously over metro distances, and asynchronously over longer distances. This feature requires a FC interface.

FlashCopy and FlashCopy Manager

This enhanced version of FlashCopy is an upgrade to the earlier announced basic V3700 FlashCopy function and enables the creation of

instant application copies for backup or application testing. It permits the data center to make better use of space with incremental or thin-provisioned snapshots, improving the utilization of storage.

FlashCopy Manager allows the data center to make an instant copy for critical applications, enabling the staff to virtually eliminate backup windows. The staff can create clones rapidly for application testing and view an inventory of application copies for instantaneous restore.

High Performance

The latest version of the V3700 comes with an optional Turbo feature, enabling the data center to increase RAID-5 performance on the V3700: Cache reads increase by 100%, to 500,000 IOPS, and disk reads improve by 65%, to 67,500 IOPS. Disk writes also are improved, by 47% to 16,200 IOPS, allowing the system to grow with business growth, while enabling the enterprise to buy only the controller power it needs.

Key Differentiators

The V3700 has been designed to address the specific issues facing the small-to-mid-sized data center: ease-of-use through an intuitive GUI helps to reduce the management complexity of storage. Internal virtualization and thin provisioning assist the IT staff in the management of storage growth. An affordable price for an entry-level system with

the advanced features of an enterprise-level system enables the data center to manage the budget successfully. Features such as a larger cache, SSDs, and Easy Tier, along with the acceleration provided by Turbo mode, enable the IT staff to deal with any storage performance issue that may arise. This is especially true when you consider that features such as the advanced GUI, thin provisioning, data migration for transparent data movement from legacy systems, and basic Flash-Copy are included in the base price. (See Exhibit 3, at the top of the prior page.)

Conclusion

With Storwize V3700, IBM has tailored one system specifically to address the block storage needs of the smaller data center, no matter which protocol is deployed, SAS, iSCSI, FC, or FCoE, with features/functions derived from IBM's high-end storage platforms. In essence, IBM is delivering highly reliable and efficient storage, in a compact package, with best-of-breed enterprise-class features at a budget price. The V3700 is easy to setup with an advanced GUI borrowed from IBM's XIV storage solution. It includes many of the same features as the V7000 in the base price in order to help the IT staff preserve the infrastructure budget while getting the job done. Easy Tier (from the DS8000), SSDs, a larger cache, and Turbo performance all can contribute to improved performance for the smaller data center.

The V3700 enables a data center to start small, and inexpensively, and grow up to 180TBs of capacity. If your business has fixed budgetary limits but expanding storage requirements, then you need to look into IBM's V3700 for your future storage requirements.



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